



## Original Communication

# Toddler run-overs – A persistent problem

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## ABSTRACT

Trauma accounts for a high percentage of unexpected deaths in toddlers and young children, mostly due to vehicle accidents, drowning and fires. Given recent efforts to publicise the dangers of toddler run-overs a study was undertaken to determine how significant this problem remains in South Australia. Review of coronial files over 7 years from 2000 to 2006 revealed 50 cases of sudden and unexpected death in children aged between 1 and 3 years of which 12 of 28 accidents involved motor vehicles (6 run-overs and 6 passengers). The 6 children who were killed by vehicle run-overs were aged from 12 months to 22 months (ave = 16.8 months) with a male to female ratio of 1:1. Four deaths occurred with reversing vehicles in home driveways and one at a community centre. The remaining death involved a child being run over at the beach by a forward moving vehicle. Vehicles included sedans in four cases and a four-wheel drive in one case (one vehicle was not described), and were driven by the victim's parent in four cases, a friend of the family in one, and an unrelated person in the final case. Deaths were all due to blunt cranial trauma. Despite initiatives to prevent these deaths, toddler run-overs in South Australia approximate the number of sudden deaths due to homicides, drownings and natural diseases, respectively, for the same age group; deaths are also occurring in places other than home driveways, and sedans were more often involved than four-wheel drive vehicles.

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## 1. Introduction

Previous studies have demonstrated a relatively high risk of low-velocity driveway motor vehicle injuries and deaths for toddlers and young children.<sup>1,2</sup> Lack of awareness of the danger of vehicles on the part of toddlers, and their small size making them difficult to see, particularly from backing vehicles, have contributed to this situation.<sup>3</sup> Given that there has been media publicity on the dangers of toddler run-overs, with public awareness campaigns, and that car accessories such as rear cameras and proximity sensors have been promoted, it was decided to examine the number of toddler run-overs in South Australia to determine how significant a problem these lethal events remain in this state.

## 2. Materials and methods

Records of coronial autopsies at Forensic Science SA were reviewed for all sudden and unexpected deaths occurring in toddlers and young children aged between one and three years over a 7 year period from 2000 to 2006. Autopsy files were retrieved and cases were reviewed. The age, sex, cause of death and other pertinent features were summarised. Forensic Science SA provides autopsy

services to the State Coroner for the State of South Australia, Australia, which has a population of approximately 1.5 million people. Over 95% of the state's coronial autopsies are performed at the centre, including the majority of cases of accidental childhood death.

## 3. Results

There were 50 cases of sudden and unexpected death in the specified age range where autopsies had been performed at Forensic Science SA. Of the 50 cases there were 28 accidents (56%), 8 deaths due to natural diseases (16%), 8 homicides (16%) and 6 cases (12%) where the manner of death was not determined.

Within the subgroup of 28 accidental deaths there were 12 cases involving motor vehicles (43%), 8 drownings (29%), 3 dehydration, 2 fire deaths, 1 blunt head trauma, 1 accidental overdose and 1 asphyxia. The 12 deaths involving vehicles included 6 run-overs and 6 passengers in crashes. The 6 children who were killed by vehicle run-overs were aged from 12 months to 22 months (ave = 16.8 months) with a male to female ratio of 1:1. Four deaths occurred with reversing vehicles in home driveways and one at a community centre. The remaining death involved a child being run over at the beach by a forward moving vehicle. Vehicles included sedans in four cases and a four-wheel drive in one case (one vehicle was not described), and were driven by the victim's parent in four cases, a friend of the family in one and an unrelated

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person in the final case. Deaths were all due to blunt cranial trauma.

#### 4. Discussion

In this study deaths due to accidents accounted for the majority of cases of unexpected lethal events in toddlers and young children over the 7 year study period, with vehicle-associated deaths being the most common (43%). This has already been demonstrated in a previous South Australian study between 1963 and 1996<sup>4</sup>, with 189 of 369 cases (51%) of accidental childhood deaths involving motor vehicles. Although drowning has been a significant cause of early childhood mortality in this population<sup>5</sup> and was responsible for 29% of the fatal accidents, this was closely followed by vehicle run-overs (21%). Given the small numbers of cases the study is not intended to provide significant population-based data, however it does demonstrate that toddler run-overs remain an ongoing problem in this population<sup>6</sup>, being close in number to other kinds of traumatic deaths.

Rates of pedestrian deaths are influenced by age and sex with three distinct high-risk groups being identified in those over the age of 16 years: including sober older individuals, intoxicated young and middle-aged males, and teenagers of both sex.<sup>7</sup> However, various studies have shown that pedestrian deaths in adults account for a lower percentage of fatalities than those involving drivers or passengers, with pedestrians accounting for only 14 and 18% of total vehicle-related deaths.<sup>7,8</sup> This contrasts with the current data where pedestrian run-overs accounted for half of the total paediatric vehicle-related deaths. This percentage perhaps confirms Schieber's observation that "the automobile is the natural predator of the child".<sup>9</sup> Not surprisingly, craniocerebral trauma was the cause of death in all of the run-over cases, as it is the most common cause of lethal injury in childhood pedestrian trauma generally. Often injuries are of such a severe nature that even immediate medical intervention would be of minimal use.<sup>6</sup>

There are obvious reasons why toddlers and young children are at risk of run-overs in home driveways that explain this age-related vulnerability. Children spend a great deal of their time in their home and yard, often playing in garages and on driveways. They have considerable curiosity and enjoy moving quickly from place to place, often in a seemingly erratic and unpredictable manner, and are unable to effectively discern danger from traffic and vehicles.<sup>3</sup> Their small size relative to vehicles also makes them difficult to see, particularly given blind spots that exist in most vehicles that are being reversed. Parents are usually the drivers and the vehicles are often large four-wheel drives that are being reversed.<sup>2,10,11</sup>

In recent years there have been a number of community awareness programmes with media attention being focussed on the problems of toddler run-overs. Devices to give better vision while reversing such as rear cameras and mirrors, and proximity warning devices are available,<sup>1</sup> and fencing of driveways has been advocated.<sup>12</sup> The data from the current study demonstrate, however,

that despite these initiatives/recommendations toddler run-overs are still occurring and that the number in South Australia approximates the number of sudden deaths due to homicides, drownings and natural diseases, respectively, for the same age group. The study also shows that deaths occur in situations other than home driveways (one incident each was at a community centre and a beach), that the vehicles are not necessarily always reversing, and that four-wheel drive vehicles are not the only type of vehicle involved (four of the six vehicles were sedans).

Given the entirely preventable nature of these incidents, and their ongoing occurrence, review of strategies to disseminate awareness of the dangers of driving near small children needs to be undertaken. It may be that devices to improve rear vision are not being utilised. Perhaps the simplest message for those driving any kind of vehicle, in any direction, in a location where there are small children, is to have visual contact with the children at all times before the vehicle is moved, or to have a second adult who is responsible for ensuring a clear passage for the vehicle away from children.

#### Conflict of interest statement

None declared.

#### Funding

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#### Ethical approval

None declared.

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